



# R U P A R K I N G

T-869-COMP

DEMO 1

IGNAS, MAXIM, STEINARR

11/27/2022

# PROJECT IDEA EVOLUTION

## BEFORE

### **Empty parking spot (Minimum requirement)**

Locate an empty parking spot somewhere on the RU parking lot.

### **Taken parking spot (Medium requirement)**

Locate taken spots regardless of car color and lighting conditions

### **Dangerous parking spot (Maximum requirement)**

Asses the quality of an empty parking spot. The quality of the parking spot goes down if there is a taken parking spot next to it, and even more down if the taken spot contains a large vehicle.

## CURRENT

### **Taken parking spot (Minimum requirement)**

Locate taken spots regardless of car color and lighting conditions

### **Empty parking spot (Medium requirement)**

Locate an empty parking spot somewhere in B1 of the RU parking lot.

### **Dangerous parking spot (Maximum requirement)**

Asses the quality of an empty parking spot. The quality of the parking spot goes down if there is a taken parking spot next to it, and even more down if the taken spot contains a large vehicle.

Photo credit: [02]

# OVERVIEW OF BACKGROUND

Similar things have been done before

Kaggle has a labeled dataset of Parking lots with positions of cars and empty parking spaces.

Matterport - An open source Mask-RCNN implementation

**Research Article:** Fast Vehicle and Pedestrian Detection Using Improved Mask R-CNN

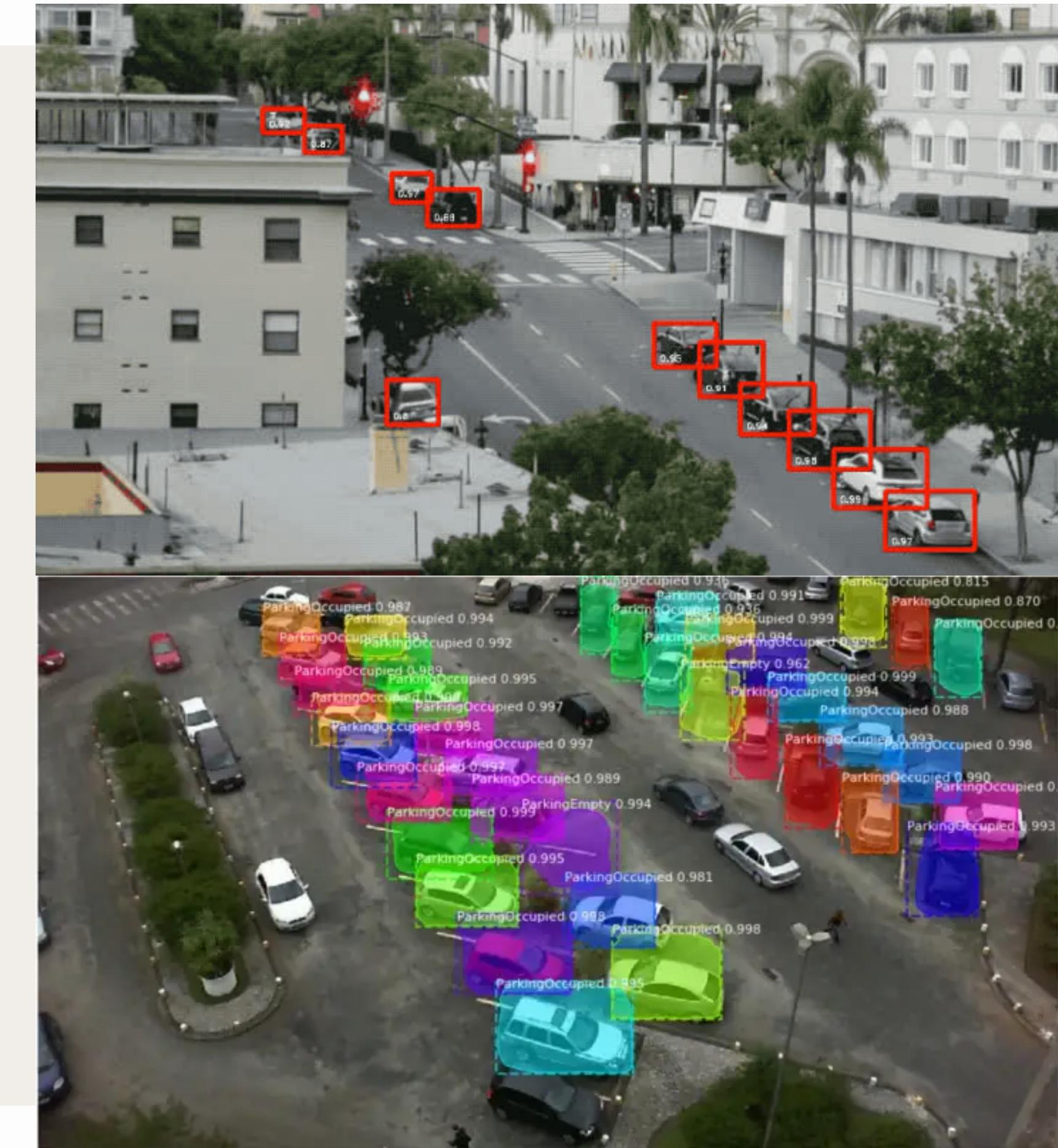
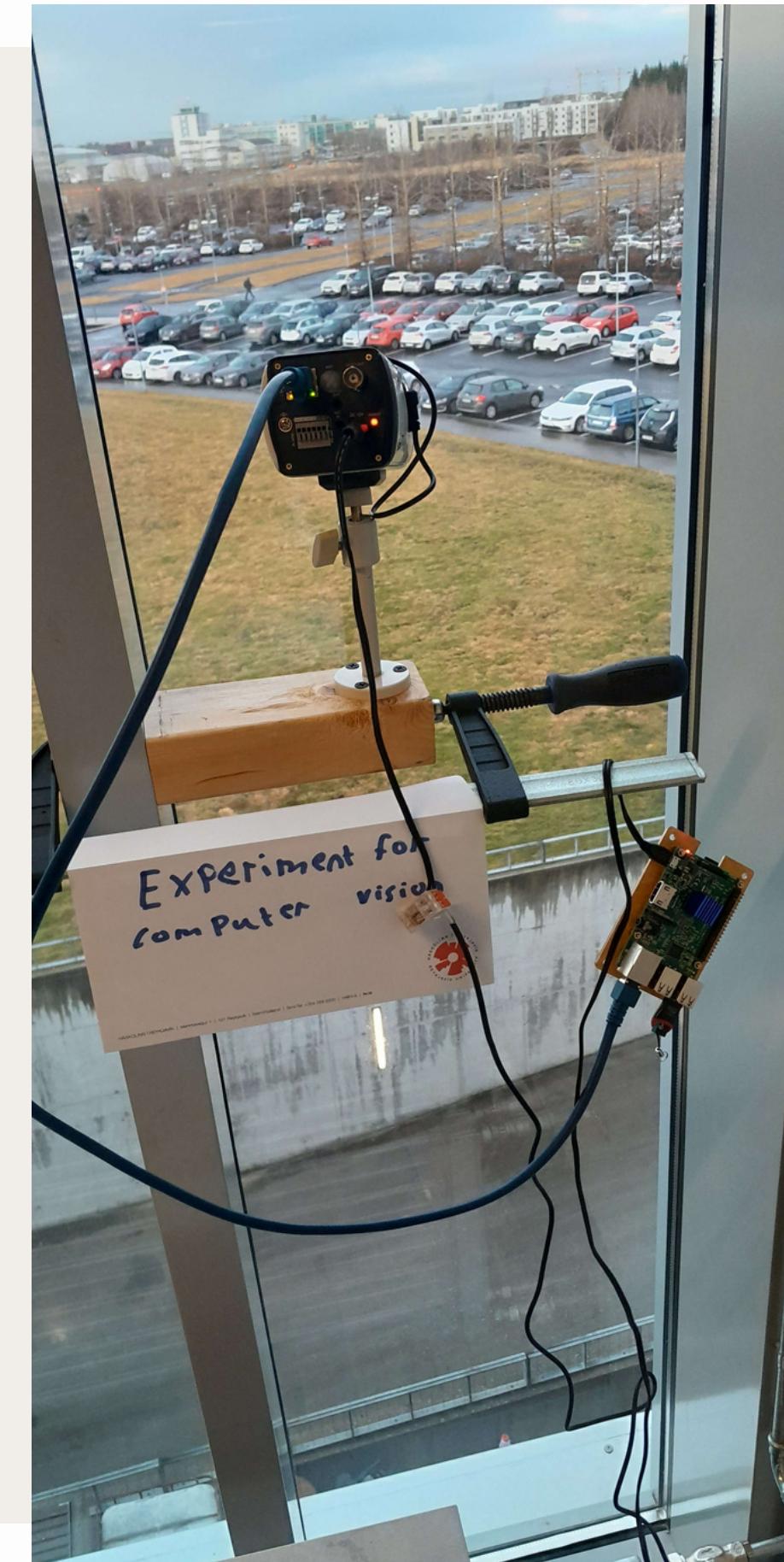


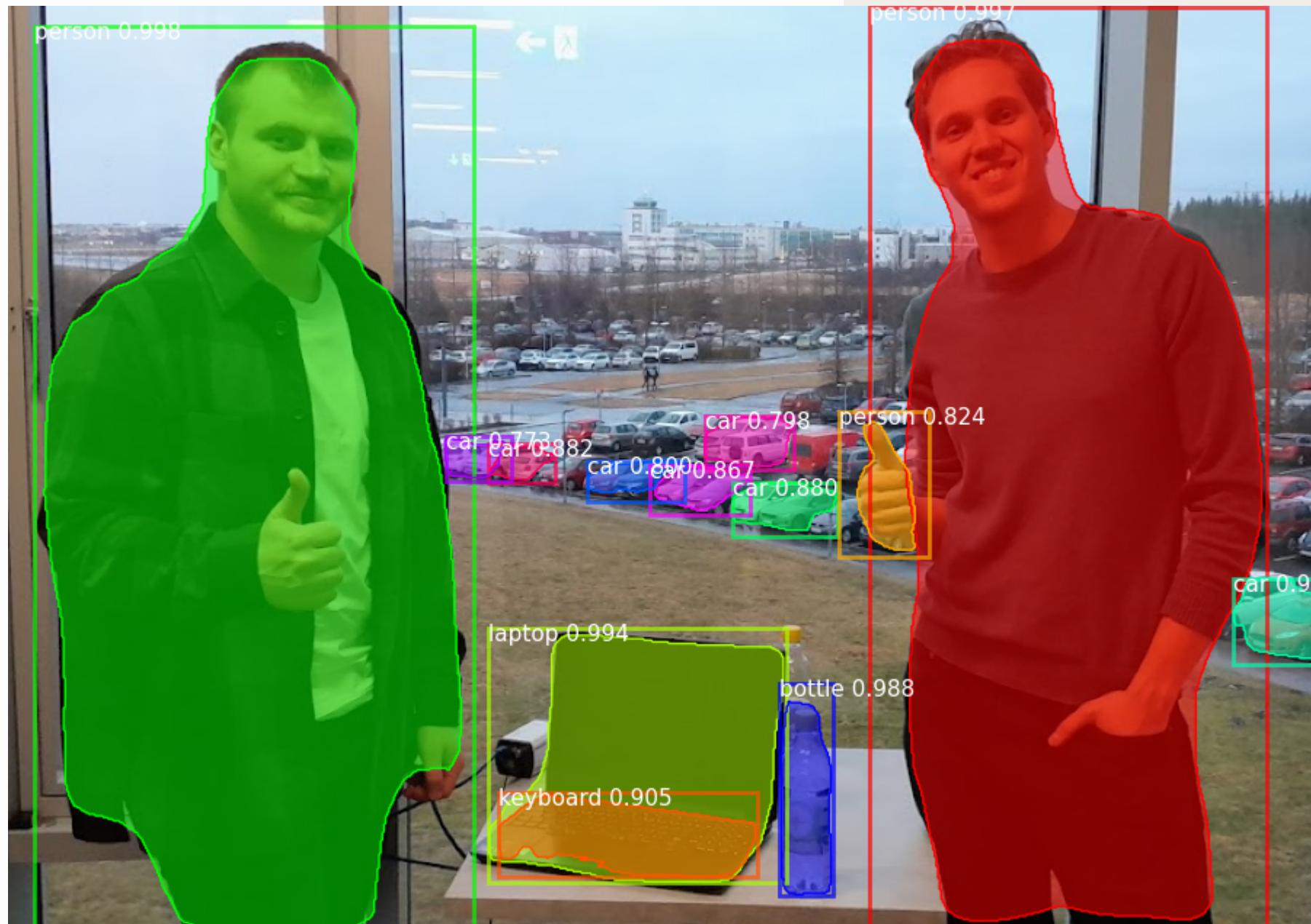
Photo credit: [04]

# SETUP OF THE CAMERA

- Camera: Hikvision DS-2CD853F-E
- Location: In the teacher's area  
between V312-V315
- Raspi 3B+



# METHOD OF DETECTION



- Using Mask-RCNN we are able to locate cars, and assume for parking spots
- Assume for empty parking spots by comparing the number of cars to the know number of parking spots on the parking area

# TAKEN PARKING SPOT CURRENT CAPABILITIE



## PERFORMANCE MEASUREMENT

### Taken vs True taken

- Around 18% of cars not detected from 10 images.
- Around 70% of cars not detected were white

### Empty vs true empty

- Around 70% accuracy of determining empty spot from 10 images.

# WORK INVOLVED

## Division of labor

- Steinarr : Setting up Code
- Maxim/Ignas: Finding location, Cameras and setting up equipment
- Maxim/Ignas/Steinarr: Performing tests

## Time consumption

- Raspi for data logging
- Camera functionality
- Setting up RCNN

## Challenges

- Good data gathering but bad data (good figures, bad angle)
- Locating empty spots with good accuracy

## PLAN GOING FORWARD

### Changes to original plan

Change of location, only shows parking in B1.

### Goal for final demo

show results of locating empty parking spots, with danger level of that parking spot . Detect more than 30% of the white cars



# D E M O N S T R A T I O N

## CITATIONS

01

<https://www.hugo.team/blog/how-to-make-a-plan>

02

<https://medium.com/@ageitgey/snagging-parking-spaces-with-mask-r-cnn-and-python-955f2231c400>

03

[https://www.researchgate.net/publication/341792441\\_Fast\\_Vehicle\\_and\\_Pedestrian\\_Detection\\_Using\\_Improved\\_Mask\\_R-CNN](https://www.researchgate.net/publication/341792441_Fast_Vehicle_and_Pedestrian_Detection_Using_Improved_Mask_R-CNN)

THANK YOU